THE VETERINARY RECORD

A Weekly Journal for the Profession.

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S.

No. 1663 MAY 22, 1920. VOL. XXXII.

THE R.C.V.S. WAR MEMORIAL.

The first subscription list of this Fund, published on March 13th, looked hopeful. Since then its progress, while not wholly unsatisfactory, has been distinctly slow. A few fresh names have appeared each week; but neither in the number of subscribers nor in the amount subscribed is the Fund fulfilling its original promise.

The first list contained 33 names and represented some £347. To-day, two months later, the total number of subscribers does not greatly exceed 100, and the total amount subscribed falls short of £600. Further, a great deal of such success as the Fund has attained is due to few good subscriptions and one or two munificent ones. One donation of £100, one of £50, one each of £20 and £15 respectively, and about a dozen of ten guineas or pounds, altogether make up more than half the present total. Subscribers of sums more in accordance with average veterinary resources have been too few to make a good subscription. Practically this means that, so far, the rank and file of the profession are responding slackly to the appeal.

This should be altered. The Fund deserves support from every member who can afford it, and from every Veterinary Society. The occasion is unique; it is desired to perpetuate many worthy names, some of them widely recognised as such by their contemporaries, and the opportunity of doing so is not likely to occur again. The exact manner of the Memorial—that is, the use to which the major part of the Fund will be applied—will in some measure remove what has always been a reproach to the profession. Every profession claiming to possess special knowledge should have a permanent centre for the records of this knowledge, to which advanced students may refer. The fact that comparatively few men will ever make use of such centres lessens neither the value of the work of those few, nor the obligation upon the profession to provide facilities for it. We have consistently ignored that obligation; and the result is that, in this particular direction, we have nothing to show that can be called worthy of a profession. Compared with similar medical institutions in this country, our library and museum are simply contemptible. We could choose no better method of honouring our dead than one calculated to remove an old discredit to our craft and to put something worthier of our modern pretensions in its place. The thing can be well done if a sufficient number of the rank and file follow the lead that a few have set.

SUPPOSED EFFECTS OF MAG. SULPH. ON A DOG.

Subject:- A Scotch Aberdeen Terrier, age about 5 years.

The owner was advised by his kennel man, a "doggy" man, to give his dog a dose of Epsom Salts to purify its blood, as it was suffering from an itchy condition of skin. Disease suspected eczema. Patient suffered periodically from "Inter-digital cysts," which caused it great pain, and considerable inconvenience at times when the attacks occurred.

Mag. Sulph. ʒii was administered in a wine-glassful of water. The dog struggled violently during administration and shortly afterwards breathed with difficulty, and made frequent attempts to vomit, also uttered piercing shrieks, as if in pain.

When brought to my Infirmary it appeared in a semi-comatose condition, and completely paralysed. The hind limbs were devoid of sensation to pin pricks. There were fits of retching, accompanied by piercing shrieks, and the abdominal muscles were firmly contracted, but no convulsions present.

Diagnosis. Doubtful. Decided to wait and see. No Bronchitis or drenching pneumonia present as far as I could tell.

Treatment. I gave inhalation of steam medicated with Terebene, etc., which gave marked relief. The dazed condition gradually passed away, and next morning the animal was able to walk, and gradually improved. To combat paralysis I had the dog held up regularly at intervals by the hind legs, as recommended by Mr. G. Mayall, M.R.C.V.S., which proved efficacious, and the dog recovered ultimately.

Remarks. The owner stated that ere giving the Mag. Sulph. the dog was quite well, bar being itchy in its skin. I have seen the harmful effects of Mag. Sulph. on cattle frequently in cases of milk fever, infection, etc., but never in the dog before. I wondered if the symptoms were due to the rapid absorption of Mag. Sulph. into the blood from the Trachea and Bronchi. I've always found Willows' & Co., Tablets of Mag. Suph. and Arsenic cheap and effectual in cases of eczema in dogs, and have experienced no untoward results up-to-date.

Folkestone, May 15. HENRY B. EVE, M.R.C.V.S.

MOTOR VEHICLES—REGISTRATION.

Sir E. Geddes, in a reply, said:—The question of the registration of motor vehicles is under consideration by the Departmental Committee on Taxation and Regulation of Road Vehicles, and I hope to be able to introduce a Bill amending existing legislation on the subject in due course.

ABSTRACTS FROM FOREIGN JOURNALS.

Bovine Epizootic Contagious Keratitis,

Daille describes this condition in the *Revue Vétérinaire* of the present year. An ulcerous keratitis, of clearly epizootic character, exists in North America. Daille has seen many cases of it in cattle imported into France to districts devastated by the war. The disease is known by various names, such as epizootic keratitis, enzootic keratitis, epidemic keratitis, acute infectious keratitis, infectious catarrhal conjunctivitis, contagious ophthalmitis, etc. It also exists in Europe—in Germany, Holland and Russia, in France, in the Ardenne region, and in Italy, especially in Sicily. According to Mitter, it also exists in English India.

The disease evolves as an acute conjunctivitis, with primary corneal localisation. In the typical form, keratitis developes from twenty-four to forty-eight hours after the symptoms of conjunctivitis. The cornea becomes opaque and lactescent, while there is an intense congestion round the corneal border. At a later stage ulceration is established, and keratocele (hernia of Descemet's membrane through the ulcer) developes. Most frequently the affection is unilateral; and judging from the resistance of the animals to examination, it must be accompanied by acute pain. It lasts for some months, and almost always leaves a corneal blemish. At other times the disease is less severe, and complete evolution and cicatrisation take place in a couple of weeks.

Various micro-organisms are credited with causing the affection, viz., cocci, bacilli (the bacillus pyogenes of the ox, Poels), and the pneumo-bacillus of Fraenckel and the bacillus of Morax-Axenfeld, which cause conjunctivitis and keratitis in man.

Infection occurs by immediate contact, and is afterwards propagated by co-habitation. The possibility that flies may also bear a share in the diffusion of contagion cannot be excluded.

The disease is often serious, because it may lead to blindness, or at any rate to corneal blemishes. According to Reischig, 80% of affected cattle are cured. Stephano and Daille give much more modest figures, their recoveries being from 4% to 10%

As regards treatment, good results are obtained by washing with sodium borate or with oxycyanide of mercury. Better treatment is an alternation of methylene blue (1%) with cocainised astringent collyria. As regards prophylaxis, rigorous isolation of affected subjects and disinfection of premises are advised. As a means of protecting cattle which are healthy, a quarantine of from eight to fifteen days is recommended.—(*La Clinica Veterinaria*).

W.R.C.

(An abstract of a note by an American author, upon the disease as seen in North America, will be found in the V.R. of January 3, 1920, page 304—*Transl.*)

CHLOROFORM ANÆSTHESIA IN THE HORSE.*

Prof. E. Brayley Reynolds, M.R.C.V.S.

The passing into law of the Animals (Anæsthetic) Bill has doubtless been responsible for the frequency with which Anæsthesia has been brought up as a subject for discussion at recent meetings of various Veterinary Medical Associations. The subject, however, is at the moment of such great importance that I make no apology for bringing it up for discussion at this Society. Unfortunately the conditions at the Central Society are such that it is impossible to arrange for a practical demonstration beforehand. I purposely intend to limit my paper to chloroform anæsthesia only, in the horse, for other methods of inducing anæsthesia and anæsthesia in other animals could not well be treated with justice within the limits of a single paper; each in itself would supply amply material for other discussions. I may further state in introducing my paper that the information contained in it has been obtained by a careful study of the recorded experiments and observations of physiologists working upon chloroform anæsthesia, and from the writings of human anæsthetists and of veterinary surgeons, and I have also endeavoured to incorporate my own clinical observations and experience.

Before proceeding to treat of chloroform anæsthesia in the horse it is very important to state a broad definition of what is really denoted by the term general anæsthesia. Definitions of the term are somewhat hard to find, for it appears that conceptions differ as to the significance of the term. The American authority Gwathwey, J. T. writes:- "The state induced by the administration of inhalation anæsthetics is designated by the usually accepted phraseology, general anæsthesia, anæsthesia, narcosis, all signifying unconsciousness with general loss of sensation, including, of course, *loss of pain sense*."

"Analgesia, loss of sensibility to pain, is not to be confounded with the above terms. The terms "light anæsthesia" and "heavy anæsthesia" whose use has been challenged by some writers are not incorrect, if considered to apply merely to degrees or stages of anæsthesia."

Starling defines *pain sense* thus:- "It is the expression in consciousness of the reflexes of self preservation which can be evoked in the spinal animal by stimuli which are nocuous, i.e. calculated to do actual damage to the tissues of the body."

The late Sir Frederick Hewitt stated:- "The term general surgical anæsthesia is commonly applied to that state of profound insensibility which is brought about by the action of a general anæsthetic, and which is of such a character as to allow of the painless performance of any surgical operation."

I have said that it is important to obtain some notion as to what anæsthesia, or surgical anæsthesia, really means for it is upon this point, or as I might say upon the attainment of this desideratum, that the whole discussion turns. From a perusal of the recent reports from the various veterinary societies I have been forced to the conclusion that veterinary surgeons in general have a somewhat erroneous conception as to the significance of the term. It seems to be the general belief that anæsthesia is a state that can be induced in the horse with little or no risk. This belief can only be attributed to the fact that many speakers have not been in the custom of placing their patients in a state anywhere approaching complete anæsthesia. The only speaker who seems to have appreciated the subject with some degree of gravity is Colonel Brittlebank, who at a meeting of the Lancashire Division of the National Veterinary Medical Association stated: "There is no doubt that the question

* Read at the monthly meeting of the Central Veterinary Society, at Red Lion Square, London, W.C., on Thursday, May 6th.

of the administration of anæsthetics is a serious one, and probably more serious than the profession realises"—(*Vet. Record*, 1920, Jan. 31st, p. 368).

I do not wish to convey the impression that chloroform anæsthesia in the horse is fraught with such drastic consequences that it cannot be undertaken with a very small amount of risk by any qualified veterinary surgeon who exercises due precautions. On the contrary, the horse is a good subject for chloroform anæsthesia, I mean good as compared, say, with the human subject. One learns that owing to the risk attendant upon the administration of chloroform in the human subject anæsthetists are continually endeavouring to ascertain the action of new preparations and methods and channels of administration eventually to obviate the untoward results that frequently follow upon the administration of chloroform in the usual manner—by inhalation.

Among the points which tend to make the horse a good subject for general anæsthesia (especially as compared with the human subject) are :—

1. The absence of fear or premonition.
2. The better condition of the animal usually operated upon.
3. The comparative absence of certain diseases which are of not infrequent occurrence in the human subject, such as heart disease, hyperthyroidism.
4. The operations for which anæsthesia is usually induced in the horse are of by no means so severe or exhausting a nature as those very often resorted to in the human subject. It may be said that the great majority of what may be termed major operations in the horse are of very short duration, or at least they should only be in practised hands. In fact what Flagg, the American Anæsthetist, describes as incomplete anæsthesia, viz., the mere induction and not the maintenance of a state of anæsthesia is all that would be required for by far the greater number of operations in the horse.

The first sub-heading may perhaps provoke some controversy. Some people may say that animals, and especially horses, do actually experience fear as evidenced by the high degree of uneasiness and excitement which some exhibit during the preliminary stage of chloroform anæsthesia. And, the sudden enforcement of methods of restraint and the impinging of a strange pungent vapour upon the mucous membrane of the nostrils in highly bred or so-called temperamental animals produce undoubtedly a degree of excitability and a certain anxious expression which would be difficult not to reconcile with the signs of fear in the human subject. But, on the other hand one cannot attribute to the horse such qualities as premonition or mental shock to anything like the intensity in the human subject. So-called surgical shock which not infrequently brings about fatalities in the human subject is of much smaller consequence in the horse, although I am decidedly of opinion that this condition is liable to occur in the horse when the operation is prolonged and severe.

Symptoms in the Induction of Chloroform Anaesthesia.

The symptoms observed in this process are usually grouped in four stages for convenience of description, but the process is really continuous, and there is no well-marked boundary separating the various stages,

The first stage is characterised by excitability and the exhibition of certain reflexes. The duration and intensity of the symptoms vary with the drug and the animal. With chloroform in the horse this stage is not a prolonged one. The excitement exhibited is regarded by some as evidence of stimulation, but as with alcohol, the apparently stimulatory effects are more probably the result of depression of the higher controlling centres than of true stimulation. In the horse the degree of excitement is increased by the enforced restraint, by the sudden inhalation of a strange vapour, and perhaps sometimes by the crude method of administration. And, as previously remarked, these influences may induce even a degree of fear. The reflexes referred to are the direct result of the irritant action of the vapour on the nasal mucous membrane. This irritant effect causes increased secretion from the mucous membrane of the respiratory tract, salivation—more marked in the dog and in man—and sometimes coughing. The rate of respiration is decreased, and breath-holding even may occur, and the heart beat is slowed. Later. as a result of the struggling accompanying the excitement, the rate of respiration and of the heart is increased.

The second, or narcotic stage, is characterised by loss of volitional control. Excitement and struggling are greater, and in the horse may be accompanied by neighing. The eyes are wide open, and the eyeballs tend to rotate, usually in a horizontal plane. The pupils are widely dilated. Respiration is accelerated, but irregular owing to the struggling ; the pulse is also accelerated. Urine, and more rarely, fæces, may be passed. This gradually merges into

The third, or anæsthetic stage, which is marked by the gradual onset of muscular relaxation. The respiration becomes slower, deeper and more regular. The eyelids are not so wide open, and the pupils resume a more normal size. If the anæsthesia is very deep the corneal reflex may be almost absent, but the pupil should always re-act to light. This is the safe operative stage, and it may be maintained by a much smaller dosage of chloroform. If, however, the administration of the drug is continued in too great concentration,

The fourth. or paralytic stage is entered upon. The first noticeable symptom is usually a marked change in the respirations. They become short, shallow and jerky. The pulse becomes softer and weaker, and the pupils suddenly dilate and become insensitive to light. These symptoms are due to the poisonous effects of the drug on the heart and vital centres in the medulla. And they would be followed by complete respiratory and cardiac failure unless such premonitory symptoms were recognised early and immediate steps taken to counteract the effects they indicate.

It has been observed that it is by no means uncommon for a horse to exhibit convulsive movements shortly before collapse resulting from overdosing (Wallis Hoare). The possibility of this occurrence should be borne in mind if an animal apparently in a state of surgical anæsthesia should show uncontrolled purposeless movements of the limbs, in order that such symptoms may not be mistaken to indicate a partial recovery from the anæsthetic and a further dose of the drug given to check them. In such an eventuality, steps should be taken to ascertain the true state of anæsthesia in which the animal is.

The Mechanism of Chloroform Anæsthesia.

To obtain an approximately correct interpretation of the various phenomena observed during the process of anæsthesia, it is necessary to get some idea as to the effect of chloroform after absorption by inhalation upon the various tissues, particularly the respiratory and circulatory systems. The following short summary of what may be called the physiological, or pharmacological, effects of the drug are therefore given to elucidate these points.

Action on Respiration. The immediate effect of inhaling the drug is irritation of the nasal mucous membrane, with the nerve endings of the fifth cranial nerve contained in it. This gives rise to slowing, or cessation, of the respiratory movements, and a slowing of the pulse rate. These actions are reflex. It can be shown on small experimental animals that if the nasal mucosa be previously painted with a solution of cocaine, or the fifth

nerves cut, they do not occur. As already remarked, respiration is irregular during the excitement stage, and as a result of the struggling a large amount of the vapour may be inhaled. The rate of assumption of chloroform in the blood is very rapid in the initial stages, and, if the vapour of the drug is inhaled in sufficiently large quantities, a dangerously high percentage in the blood may soon be reached. The margin between the amount of chloroform in the blood necessary to produce complete surgical anæsthesia and that which will abolish respiration is only a narrow one.

Failure of respiration in the later stages occurs along with, and is consequent upon, a marked fall in blood pressure owing to paralysis of vital centres in the medulla as a result of overdosage. The respiration fails not so much from the respiratory centre becoming insensible to its normal reflex stimuli, as from the fall of blood pressure, the result of paralysis of the vaso-motor centre and mechanism, and the impaired action of the heart muscle.

Before passing on from the effects upon respiration, mention should be made of two other conditions that are sometimes set up during chloroform inhalation and which then affect respiration. They are :- Stertor, and Laryngeal Stridor.

Stertor or snoring, is caused by relaxation of the soft palate and, unless it is very pronounced, is of no great consequence. From it must be distinguished laryngeal stridor—a very much more serious condition. This has a much harsher sound, and is caused by approximation of the vocal cords brought about by spasms of the adductors of the cords. It occurs commonly in the human subject. Inspiration of fluids are a common cause ; occasionally it is set up reflexly from the operation area ; more rarely no apparent reason for its occurrence is discoverable. Inspiratory efforts are still made, but little air reaches the lungs, and if the condition be unheeded a degree of asphyxia may arise sufficient to embarrass the heart seriously. Failure of the circulation will be followed by failure of the respiration ; a vicious cycle being set up.

Action on Circulation. An early effect of chloroform inhalation may be sudden stoppage of the heart. This failure of the heart is due to direct inhibition, the result of over excitement of the vagus centre in the medulla brought about by the rapid absorption of concentrated chloroform vapour. If the inhibition is complete, release from it is rarely obtained. Respiration ceases at once. Inhibition can be readily induced in the dog, but it does not occur if both vagi have been previously cut, or if a dose of atropine has been administered. This drug blocks the inhibitory impulses by paralysing the endings of the vagus in the heart muscle. The method of destroying dogs by injecting chloroform up the nostril owes its effectiveness to this sudden inhibition of the heart.

This primary syncope is peculiar to chloroform. It is of rare occurrence in the horse, and although in the cases in which it does occur some cardiac unsoundness is usually found, the inhalation of chloroform vapour is not without risk to a horse with a sound heart. It is only in the early stages—the first minute or two—that the accident happens, for the centre responsible soon becomes depressed and loses its sensibility and is incapable of further reaction.

Owing to the depressant action of chloroform on the muscle tissue of the blood vessels, vaso-dilatation occurs, and a corresponding depressant action on the cardiac muscle diminishes its force of contraction and the heart dilates. As a result of these two effects there is a progressive fall in blood-pressure throughout the administration of chloroform. If the drug has not been administered in too great concentration the fall is gradual and even, but otherwise, or if it is administered over a prolonged period, the vaso-motor centre becomes paralysed and the fall in blood pressure is marked, and respiratory failure will occur.

Another effect connected in part with the circulation is that upon temperature. The body temperature declines steadily. In the majority of operations on the horse this is of little importance, because owing to their short duration the fall is insignificent. In prolonged anæsthesia the fall may be considerable. Two actions in the body are concerned in bringing about this effect ; (*a*) increased heat loss ; owing to the depressant action of the drug on the plain muscle in the blood vessels dilatation of the skin vessels gives rise to an increased loss of heat ; (*b*) a diminished production of heat, the result of the general depression of all activity of the tissues and the absence of voluntary movement.

There is still one other point that must not be overlooked. It is one that concerns both respiration and circulation. Chloroform after absorption from the lung alveoli is conveyed by the red corpuscles in the blood. It has been observed that the oxygen content of the blood during the anæsthetic state is reduced by about 40 per cent ; and that this reduction is probably brought about by direct interference with the oxygen-transporting property of the red corpuscles (Buckmaster).

Administration.

Points to be observed. Bearing in mind these actions of chloroform upon the vitally important, and intimately associated, respiratory and circulatory systems, and the lessons that have been learned from practical experience in the administration of the drug to all species of animals for which it is used, general principles may be formulated on which should be based its mode of administration to the horse. Although experience has seemed to indicate that, allowing for extraneous influences, the horse is less susceptible to the action of chloroform than some other species, the physiology of this animal does not differ so much from that of other species as to justify any direct violation of, or definite departure from, the principles that have to be observed in the administration of chloroform to a member of the most susceptible species.

The initial chloroform vapour concentration should be low in order to avoid too much irritation of the nasal mucous membrane, which might tend to inhibit respiration, and in order to prevent, more particularly, rapid absorption of large quantities of vapour by the blood stream which would lead to a sudden over-stimulation of the vagus centre, with resulting serious cardiac inhibition. Especially has this to be guarded against, for almost without exception more or less severe struggling occurs at the commencement of administration, when large amounts of chloroform vapour may be inhaled. The respiratory and vagus centres soon lose their sensitiveness to this excitory effect. The vapour concentration should then be increased so that the stage of anæsthesia may not be too long delayed. Two to two and a half per cent has been found to be a safe concentration in other species, but in practice it has been recommended that this degree should not be exceeded. There is every reason to assume that these figures are equally applicable to the horse ; for the body weight has no influence upon the percentage of chloroform in the blood necessary to produce anæsthesia (Buckmaster). When, according to the symptoms shown, the anæsthetic stage has been reached, the concentration should be lowered, and from then onwards maintained as uniformly as possible, with due regard to the symptoms displayed. Spasmodic administration, whereby the patient is allowed to come out of anæsthesia and concentrated vapour again suddenly given to regain it, must be avoided. In connection with this point it is perhaps worth while quoting an observation made by Crile during his experiments in connection with surgical shock :- "If the animals were allowed to

partially recover from the anæsthesia, care was necessary in reducing them again to surgical anæsthesia, as the tendency to hyperpnoea attends this state, and an excess of the anæsthetic is likely to be inhaled. The exhausting over-respiratory effects predispose the respiratory centre to failure, and special care was always necessary at this point."

The poisoning of the organism is continuous and is accompanied by a gradual fall of blood pressure, which may become serious on the sudden inhalation of concentrated vapour. In addition, reflexes having a serious effect may be set up at the seat of operation during the periods of incomplete anæsthesia.

The principal and best guide for administration is the character of the respiratory action. Although when death occurs it is the result of cardiac collapse, it is almost invariably preceded by signs of respiratory failure, except of course, in those cases in which sudden and complete inhibition of the heart occurs. Chloroform should be administered by such a method that the administration can be stopped immediately and completely if from any cause whatever this is desired.

Accidents Liable to Occur.

These have already been indicated. The procedure to be adopted to deal with them, when they threaten to occur, or have actually occurred, will be described.

Where there is breath-holding, or violent struggling in the early stages of administration causing thereby too great an amount of chloroform to be inhaled, the drug should be completely withdrawn. Withdrawal for one or two respirations will suffice to bring about more regular breathing and to lessen struggling.

Where there is inhibition of the heart little can be done. If the inhibition be not complete a full dose of atropine intravenously, given with a liberal amount of normal saline, may succeed in releasing the heart by paralysing the vagus endings in the heart muscle. If inhibition is complete respiration usually stops simultaneously. Relief from this condition is almost impossible.

Stertor or Snoring. This is not serious provided it is not very pronounced. Occasionally the degree of snoring may become somewhat alarming in operations in which it is necessary to place the animal in the dorsal position, as for instance, in rig and hernia operations. In such a posture the condition is probably aggravated because the base of the tongue tends to fall downwards into the pharynx. When animals have to be placed in such a position, it is essential to secure the tongue against falling backwards into the mouth, preferably by fixing it with tape to the head stall. This is better than holding it by the hand, for wounding of the under surface of the free portion of the tongue on the teeth, or tearing of the frenum is less likely to follow upon any sudden movement of the animal's head. Another precaution that ought to to be adopted with an animal in this position, if the operation permits of it, is to allow the head to rest laterally, and this can be done more easily by inclining the animal's body slightly to the same side as that to which the head is turned. In this manner the head can be inclined to the neck at a more natural angle than when it is otherwise unnaturally extended on the poll.

Laryngeal stridor. This, too, is probably more frequently seen in operations in which the patient has been partially anæsthetised while lying on its side and afterwards placed in a dorsal position, and particularly in animals suffering from laryngeal hemiplegia.

In operations for roaring, however, it is necessary to have the head placed with the poll downwards and the head unnaturally extended on the neck. Mucus accumulating in the posterior nares and pharynx in all probability becomes inspired when the head is so placed ; for in these operations one commonly finds a considerable amount of mucus in the pharynx and laryngeal ventricles on opening the larynx.

Laryngeal stridor must be attended to by examining for and removing any obstruction to respiration, and if the condition be definitely established the anæsthetic should be withdrawn altogether and artificial respiration practised. It may even become necessary to perform tracheotomy, and there should be no undue delay in resorting to this operation. If the operation that is to be performed be that for stripping the ventricle, one should hasten to make the incision into the larynx and not wait to arrest the hæmorrhage which results from incising the skin and dividing the tissues to lay bare the crico-thyroid membrane.

The most reliable guide in the administration of chloroform is the condition of the animal's respiration. If the respiratory movements become appreciably short, shallow or jerky—for such symptoms indicate cardiac failure, the anæsthetic must be withdrawn immediately and any impediment to respiration removed.

If the withdrawal is not soon followed by improvement, all restraint should be removed and artificial respiration commenced. It is advisable to turn the patient over, for this tends to improve the circulation. Owing to the size of the horse, artificial respiration cannot be carried out quite so effectively as in the smaller animals. Energetic and deep pressure should be exerted at regular and not too frequent intervals by placing the foot upon the abdominal wall just below the arch of the upper asternal ribs. Care should be taken not to interfere with any natural respiratory effort.

Various medicinal agents have been recommended. A hypodermic injection of strychnine may be given ; it is a good respiratory stimulant and cardiac tonic. One may also apply the fumes of ammonia to the nostrils, but care should be taken in employing this procedure. When given in moderation, the fumes will tend to stimulate respiration by irritating slightly the mucous membrane at the back of the nostrils, but if they are given in too great concentration spasm of the glottis will occur, and the resultant effect will be more harmful than beneficial. The administration of a full medicinal dose of Scheele's hydrocyanic acid is recommended by many people, but, although respiratory stimulation may be part of its initial effect after absorption, its subsequent depressant action upon respiration should not be overlooked. However, the most effective means of resuscitation are probably the securing of a clear air way and the maintainence of regular artificial respiration.

Surgical shock. This condition is liable to occur in the horse when the operation is prolonged and severe. It is more readily brought about when tissues (more particularly specially sensitive tissues such as the peritoneum and spermatic cord) are pulled upon or torn than when divided by the knife. As Crile points out, in the course of a surgical operation performed under anæsthesia, even deep anæsthesia, what may be termed a summation effect of successive stimuli from the seat of operation is produced. At first each stimulus brings about an initial rise in blood pressure with an immediately following fall. Eventually, however, the vasodilator effects of the stimuli completely mask the constrictor effects, so that nothing but a lowering of the patient's blood pressure is produced by the operator's manipulation—hence the subject collapses from surgical shock. It has been stated that the liability to surgical shock is greater with chloroform than with any other anæsthetic.

The employment of local, in addition to general, anæsthesia, will "block" the stimuli set up at the seat of operation and will materially assist in preventing the occurrence of surgical shock.

XUM

ADMINISTRATION IN VETERINARY PRACTICE.

Preparation of the patient. Preparation other than that which may be necessary for the operation itself consists in withholding solid food for several hours beforehand. Anæsthesia is more easily induced in an animal that has been fasted, and there is a smaller tendency to interference with respiration owing to the decreased pressure on the diaphragm. Food must not, on the other hand, be withheld over such a period that the animal is starved, even slightly starved. And this should be guarded against especially when the operation is likely to be severe or prolonged, for starvation predisposes to surgical shock. The pulse and heart should be examined for any irregularity or defective action.

The animal's nose should be smeared with some bland ointment or grease in order to prevent any excoriation of the skin by the liquid chloroform, and especially when those methods of administration in which this is liable to occur are employed. This greasing is unnecessary when the valved inhaler which will be described later is used, for none of the drug in a liquid form can come in contact with the skin.

Common methods. The administration of chloroform may be begun while the animal is standing, or after it has been cast and secured. In the former method a fairly considerable open space is necessary in order to avoid accidents. The chloroform muzzle is put on and the animal steadied by a rope from either side of the headstall or halter. With adult horses a fore leg may be tied up. The standing method is probably preferable for young unbroken animals, and may be employed for older animals when sufficient help for casting them is not available. If space is limited the animal must be cast and secured before commencing the administration. It has been argued that the risks from casting can be avoided by administering the drug in the standing position and allowing the animal to sink gradually to the ground. This argument however, is not a very strong one, for accidents are rare if the casting is done efficiently and carefully, and they are probably of no more frequent occurrence than those liable to happen in chloroforming standing. The administration of chloroform after first casting and securing is the more rational method, because it can be definitely controlled and regulated according to the symptoms displayed.

The common methods by which chloroform is administered to horses come under the heading of what, in human practice, would be called the "open" or "semi-open" method ; and the manner in which the drug is given is the "douche" as compared with the "drop" method. A quantity of chloroform is poured on a piece of sponge, felt, or cotton wool, which is placed in some form or other of muzzle usually made of leather.

Muzzles. A Roberts, or a Nelder muzzle may be used for administering chloroform to a horse in a standing position. These muzzles cover both jaws and are fixed on to the head by a strap around the poll. The former muzzle has an opening at the bottom through which the drug is put on to the sponge ; the latter type is padded at its upper margin to fit closely on to the jaws, and it has an outer shell at the bottom of which there is a thick pad of felt on to which the chloroform is poured.

For administration to an animal which has been cast a Cox's muzzle is the pattern most commonly employed. This consists of a leather cylinder covered with canvas, at either end of which is a purse-string arrangement. The muzzle is applied to the upper jaw only and held in position by a poll-strap ; the upper string is tied in order to prevent largely the entrance of air at this end. A sponge or wad of cotton wool on to which a comparatively large dose of the anæsthetic has been poured is placed in the free end, which is then closed by pulling the bottom purse string.

Many hold the opinion that the induction of anæsthesia is facilitated by closely wrapping the muzzle and the whole of the head in a rug or blanket in order to limit the amount of air inspired ; the blanket is opened or loosened to admit more air when the animal has become anæsthetised.

We may examine one or two essential features in this simple and common method of chloroform anæsthesia. If the sponge is placed in the closed end of the muzzle so that a current of air does not pass through it, it is obvious that the amount of chloroform vapour taken in with each inspiration is limited to the quantity which evaporates spontaneously from the sponge. On the other hand, if the purse-string at the lower end of Cox's muzzle is tightened so as to leave an opening about two inches in diameter by which air is allowed to pass with each inspiration through the sponge held to the inner surface of this opening, then the amount of chloroform vapour inhaled will be greatly increased, owing to the passage of the atmospheric air over what is actually a very large surface, represented by the walls of the numerous little interstices in the sponge. In the former method the chloroform will not be in sufficient concentration to bring about unconsciousness of the patient within a reasonably short period of time, and hence in order to hasten the onset of this state, practitioners usually resort to limiting the intake of air, or oxygen. But, again, it is reasonable to ask whether such a state of unconsciousness is in reality true chloroform anæsthesia or a partial asphyxia, which, of course, is a comparatively dangerous condition. Perhaps, it is owing to the fact that the majority of operations for which chloroform anæsthesia is practised are of very short duration that so many thousands of administrations have been conducted in this manner and apparently without untoward result.

Cotton is not suitable as a receptacle for the liquid chloroform as air will not pass through a moistened wad of this substance.

Form of muzzle recommended. A chloroform muzzle which has been used by the writer in a very large number of cases consists of a cylindrical body part which is applied to the upper jaw only, as with Cox's muzzle. It is secured by a strap passing round the poll, and the upper end is modified somewhat so as more effectively to prevent any entrance of air at this end. At the lower extremity is a leather cone which reduces the size of the lower opening to about three inches in diameter. Into this opening there fits a metal cylindrical sponge container five inches long, at the upper extremity of which is an inspiratory rubber valve. Opening out of the front of the leather cone are two expiratory rubber valves.

The complete closure of the upper extremity of the muzzle and the arrangement of these valves ensures a definite respiratory circulation through the chloroform container. The chloroform is placed on the sponge in the cylinder and the passage of all the inspired air through the sponge aids vapourization and ensures a certain concentration. As the inspiratory valve is situated on the proximal side of the sponge, expiration of air through the sponge with consequent wastage of chloroform and condensation in the sponge of exhaled moisture are prevented. This prevention of condensation of exhaled moisture in the sponge is a point of great importance, especially if several administrations are to be carried out immediately following one another.

The advice to wring out a sponge in warm water before pouring on the chloroform is, to say the least, somewhat thoughtless, for owing to the immiscibility of chloroform with water the former will tend to run off a moistened sponge and will not be so evenly distributed or vapourized.

Further quantities of chloroform can be poured on the sponge without removing it. The animal does not thus

obtain a free supply of pure air each time an additional dose of the drug is given. By removing the sponge cylinder the chloroform can be readily and immediately withdrawn, either for one or two respiratory periods if necessary when there is breath-holding or excessive struggling, or permanently if the respiratory or other symptoms so indicate.

When the necessary degree of anæsthesia has been obtained it may be maintained by placing smaller quantites on the sponge; or, the sponge may be withdrawn and an attachment fixed to the cylinder whereby a regular supply of chloroform, or chloroform and ether mixture, can be dropped at any required rate on to a piece of gauze through which the respired air has to pass.

The proximal end of the sponge cylinder is so shaped that it can be applied to one nostril only (while the other nostril may be blocked with cotton wool) for administering chloroform to an animal on which an operation (such as some buccal operation) is to be performed in which unimpeded access to the mouth is necessary. This arrangement of the upper end also renders it suitable for administering chloroform through a tracheotomy tube when such a procedure is necessary.

The time taken to induce surgical anæsthesia by adopting this principle of so-called *per-halation* is hardly, if any, longer than that taken by the covering-up method. There is scarcely any restriction to the free intake of air, and when the anæsthesia is complete it is therefore beyond doubt a true chloroform anæsthesia.

Perhaps the greatest advantage of this method of administration is that as there is practically no wastage of chloroform vapour the exact amount of chloroform that the animal receives is known.

Dosage. It is impossible to state exact doses, and it is inadvisable and wrong in principle to attempt to do so; for, the quantity of chloroform that must be given is that which will produce surgical anæsthesia, a condition which requires different amounts in various horses. All that can be stated in this direction is what from experience has been found to be the quantity usually required to produce anæsthesia by the particular method of administration employed. This should be accepted only as a guide—not as the actual amount required by all animals; that must, and can only, be determined by the symptoms displayed by the particular animal to which the drug is being administered.

It may be laid down as a rule that every endeavour should be made to induce surgical anæsthesia as quickly as is consistent with safety, and from then on to maintain it by as small and regular a dosage as possible. That the degree of safety be directly proportional to the slowness in administration, in repeated small doses, is most erroneous. Death is known to occur from prolonged administration of small doses insufficient to produce anæsthesia.

Four ounces as the initial dose and further additions of not less than one or two ounces is a dosage that has been recently mentioned. (Cameron, *Vet. Record*, 1919, Nov. 29th, p. 250). The method employed or the drug used must have been faulty. Another veterinary surgeon states that he does not measure the quantity given and has had no trouble. (Wolstenholme, *Vet. Record*, 1920, Jan. 31st, p. 368). Although the adoption of such a plan during the induction stage is open to criticism, it is preferable to the formulation of any hard and fast quantitative dosage, since it follows that the administration would naturally depend upon the symptoms displayed by the patient.

When the Roberts or Nelder muzzle is used for administration in the standing position an initial dose of from two to three ounces is recommended; further doses of a half to one ounce are given as may be indicated.

With the Cox muzzle, either open or closed, one and a half to two ounces is generally given as an initial dose, followed by four drachm doses as appears to be necessary. Anæsthesia is produced in from about ten to twelve minutes.

With the valve muzzle described above it has been found, as the result of a very large number of observations, that an initial administration of six drachms is not attended by any serious symptoms. If there is any tendency to breath-holding or violent struggling the sponge container is removed for one or two respirations. A further quantity of six drachms is poured on the sponge at the end of three minutes; then, depending upon the symptoms a further six drachms or only four drachms is added at the end of the next three minutes. Usually this is sufficient to bring about a safe surgical anæsthesia in a fasted adult animal in about twelve minutes, and this condition can then be maintained by the addition of one or two drachm doses about every three or more minutes. The quantities stated, however, must be taken only as a guide and not as a fixed dosage. These are the doses that have been generally found to be necessary in adult animals, but instances have been observed in which the initial six drachms have apparently induced a considerable degree of anæsthesia and the addition of four drachms has completed it. In the young animal proportionately smaller dosing should be employed.

Vennerholm in his report on anæsthesia to the tenth International Veterinary Congress sums up this question of dosage rather succinctly :—"These differences are easily comprehensible in examining the different methods employed and the various conceptions of narcosis."

Termination of Anaesthesia and Prevention of undesirable Sequelae.

When the operation is sufficiently approaching completion, or is quite completed, the muzzle must be removed. There should be no undue haste, however, to release the hobbles, especially if space is rather limited. They should be kept secured in order to avoid the risk of an accident occurring owing to the animal having in sufficiently regained volitional control.

There is, too, another reason why the hobbles should not be immediately released. Occasionally an animal will relapse into what appears to be a deeper stage of anæsthesia after having shown signs of returning consciousness following removal of the muzzle. These particular phenomena have been remarked upon by several during the recent discussions but no attempt appears to have been made to explain their occurrence. This relapse into anæsthesia following the removal of the muzzle is preceded by apparent recovery; occasionally a certain amount of excitement is exhibited, and in rare instances the excitement is so intense that the symptoms displayed might almost be described as maniacal; the animal struggling violently and making violent uncontrolled galloping movements while lying on its side, occasionally neighing, and sweating profusely. If the hobbles have been removed the animal may attempt to rise but is unable to do so and only blunders forward. This extreme excitement is then followed by a sudden collapse, and the animal appears to relapse into unconsciousness. During this so-called relapse into a deeper anæsthetic stage the respirations become very shallow, slow, and may temporarily cease for periods of varying duration. The physiological explanation of these phenomena is at present obscure. The condition is confined almost entirely to those cases in which the head has been covered up and restriction placed upon the amount of air inhaled. The preliminary excitement before apparent return to unconsciousness is probably a reflex result of the cool fresh air coming into contact with the sensitive membrane lining the nostrils. The origin of the subsequent respiratory phenomena is more obscure. It is possible that after the covering up of the head the high percentage of

carbon dioxide in the blood tends reflexly to stimulate respiration, and also the degree of oxygen lack tends to maintain or even increase the blood pressure. When the head is uncovered and the muzzle removed a free supply of air is admitted, producing a consequent fall in the percentage of carbon dioxide in the blood and a decrease in its oxygen deficiency. The former effects robs the respiratory centre, already less sensitive as a result of the chloroform, of a considerable portion of its reflex stimulation ; the latter removes the tendency to vaso-constriction and allows the fall in blood pressure, which is common to chloroform anæsthesia, to take place suddenly rather than gradually. Whatever the explanation, one thing is certain ; the shallow slow breathing produces a condition of an-oxaemia which may seriously embarrass the heart ; and, although in such cases even when breathing stops it will start again when the percentage of carbon dioxide in the blood rises to a sufficient level to stimulate reflexly the respiratory centre, the condition should not be allowed to become too pronounced. Artificial respiration should be carried out.

Other sequelæ may follow chloroform administration. Choking may occur if food is given too soon afterwards. It results from insufficiently regained muscular action of the organs of deglutition, and this may be aggravated by the animal bolting the food owing to its hungry condition. No food, especially dry food or long hay, should be allowed for several hours after the recovery from the anæsthetic.

So-called chloroform pneumonia, the direct result of the chloroform administration, cannot be said to be a common occurrence in the horse. There is no doubt that the administration of the drug may increase rapidly the development of pneumonia in horses that already harbour some disease of their respiratory passages, e.g. so called shipping fever. The hypostatic pneumonia observed to develop some time after operation in which general anæsthesia has been employed in the human subject, is not likely to occur in the horse, owing to the fact that this animal is only maintained in a certain recumbent position for a comparatively short period of time.

The body surface should be protected at the time of the administration and for some time afterwards to counteract the tendency to loss of heat due to the dilatation of the skin vessels. In cases in which profuse sweating has occurred care should be taken to protect the animal from draughts or exposure to cold.

Conclusion.

In conclusion I would repeat that, though the horse appears to be a "safe" subject for chloroform anæsthesia, each administration of the drug, if it is to be efficient and safe, should be looked upon as a separate serious undertaking, and not as part of the preliminary preparation connected with the operation, and, again, not as a dosing with medicine calculated to bring about a definite reaction. For the administration to be efficient and safe, the anæsthetist must posses a knowledge of the action of the drug and have some practical experience in its employment. It behoves all veterinary surgeons to become proficient anæsthetists, not only with the object of keeping themselves within the law as laid down in an ineffective and inconsistent Act of Parliament, but also that they may protect their patients from unnecessary suffering, and carry out operations more thoroughly and with greater comfort. If we do not become proficient it is certain that more animals will be underdosed by want, than overdosed by excess, of confidence. And, finally, the liability of the veterinary surgeon should not be ignored. Preliminary warning of the owner as to the risks likely to be incurred would be but poor defence for inexperience or inability if these were established or even suspected.

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County of Lanark
Epizootic Abortion Order of 1920.

To the Chairman and Members of the Executive Committee of the Local Authority.

Gentlemen,—The preparation of these notes has been prompted by discussions which took place some time ago at a meeting of the Executive Committee, and also at a recent meeting of a Committee composed of representatives of Local Authorities in Scotland. They are not in any sense to be regarded as exhaustive of the subject, but merely as an effort to explain to the lay mind the character of the disease and the very great difficulty in combating it effectively without upsetting the dairying industry and jeopardising the milk supply. The notes will serve a useful purpose if they have the effect of impressing upon those concerned the necessity for giving the matter most careful consideration before attempting anything in the shape of drastic measures.—I am, Your obedient servant,

Hugh Begg.

March, 1920.

Epizootic abortion is a highly contagious disease, caused by the *Bacillus Abortus* (Bang). The chief predilection habitat of the bacillus is the womb of the pregnant animal, where it sets up a specific inflammatory or catarrhal condition that usually leads to the premature expulsion of the calf, and that very often before a viable age has deen reached. The fœtus, the membranes, and discharge are highly infective, and the post-birth discharge is virulent for some time, but Sir Stewart Stockman says that many cattle get rid of all infective material from the genital organs in two to three months.

When one or two cases of premature calving have occurred in a herd, hitherto free from abortion, a simple blood test can determine whether or not the cause is specific—*i.e.*, whether it is a case of contagious abortion, or a case of accidental abortion only. If several cases in a herd occur within a short time, the existence of contagious abortion may be considered as certain without any blood test.

No case of contagious abortion can possibly occur without direct or indirect contact with an antecedent case. Natural infection occurs either by the mouth or the genital tract. Though infection by the alimentary tract is most common by far, there is little doubt that a bull may be a mechanical carrier, or, being infected in the testes, will eject bacilli with his semen. Infection *via* the genital tract, apart from the agency of the bull, used to be considered very general, but is now held to be negligible. It has been estimated that twenty per cent. of the herds in this country are affected with the disease, but no accurate estimate of its prevalence could be made

without the aid of a compulsory Notification Order, for it is notorious that its existence in many herds is kept secret.

Of all the unscheduled contagious diseases of bovines—excepting tuberculosis, the Order in connection with which is meantime in suspension—epizootic abortion is the one that prevails most generally in Great Britain. The opinion expressed by many people, on first thought, that the disease is one which is clearly marked out for control by means of a comprehensive Order is not an unnatural one. Indeed, many stock-owners, as well as veterinarians—without, perhaps, giving the subject the consideration it deserves—still hold the view that the absence of an Order designed to exercise complete control over a scourge so baneful to the breeding and dairying industries is quite unjustifiable. Such a view was fostered in the mind of many people, and perhaps owed its inception in some cases to the second report of the Departmental Committee on Epizootic Abortion, of date June 1910, which recommended that, as a preliminary measure, the disease in cattle should be dealt with under an Order of the Board of Agriculture and Fisheries, requiring:—

(*a*) Compulsory notification of suspected cases of the disease;
(*b*) Veterinary inquiry to establish the existence of disease on any particular premises; and
(*c*) Temporary isolation and restrictions on the movement of any cow that has recently aborted.

However, since the issue of that report, responsible opinion has travelled a considerable way.

Additional weight was given to the claim of the stock-owner for a comprehensive Order by the unfortunate recommendation of the Travelling Commission of Enquiry into the Cost of Production of Milk, contained in their report published last spring. When sitting at Exeter, the Commission was informed of the operation in Devonshire of the Devonshire Epizootic Abortion Order of 1916, and they advised that the measures adopted against the disease in Devon should be extended to the rest of the country, without assigning any cogent reason.

Whether the operation of the Devonshire Order has produced any good results is a matter of grave doubt, and, indeed, it has been asserted that, while its administration has involved very considerable expense, and has been a source of irritation to local farmers, no appreciable benefits have accrued. Further, it is reasonable to suppose that, if the Order in question has achieved the objects for which it was designed, the Ministry of Agriculture would not have been slow to make a General Order applicable to the whole country, or at least to have recommended Local Authorities to consider the advisability of applying for an Order of similar effect.

What considerations then have prompted the issue of the Epizootic Abortion Order of 1920, and what results are Local Authorities likely to attain in controlling the disease by making regulations under it?

The Order, as will be observed on a careful reading of it, is of a very restrictive character, and one may be excused from regarding it as a slight concession by the Ministry of Agriculture and Fisheries to appease an importunate public clamouring for compulsory power for the control of the disease. The Order confines itself to:—

(*i*) prohibiting the exposure by any person in any market, fairground, or saleyard within the district of the Local Authority of a cow or a heifer which, to his knowledge or according to information furnished to him, has calved prematurely within the two months immediately preceding such exposure; and

(*ii*) prohibiting the sale by any person, within the district of the Local Authority, of a cow or heifer which, to his knowledge or according to information furnished to him, has calved prematurely within two months immediately preceding such sale, unless, before the sale, he shall have given to the purchaser notice in writing of such premature calving.

The words "has calved prematurely" are very significant and materially simplify the definition of an animal amenable to the Order. Animals that are known to have calved prematurely, whether the cause be specific or accidental, are amenable. To have limited it to aborting animals—the subject of epizootic abortion—would have caused endless worry and expense in the matter of proof. On the other hand the inclusion within the scope of the Order of animals that have aborted, whether the cause may have been specific or otherwise, is well advised, as a cow that has aborted from accident, though free from the specific disease, is rarely worth the money the unprincipled seller gets for it.

Regulations made under the Order, if strictly enforced, should have the effect of compelling individuals who hitherto have not scrupled to sell as correct, animals that were highly infective and incidentally destined to a short period of lactation, to mend their ways. Further, the prohibition of the public exposure for sale of such animals will operate to prevent the spread of the disease to free herds, to emphasise publicly its infectious character, and give confidence to purchasers at public marts.

There is no obligation on the owner of infected animals to notify the existence of disease in his herd. Indeed, he may sell privately, within two months after the Act, a cow that has calved prematurely through being the subject of epizootic abortion, provided that, prior to the sale, he notifies the fact in writing to the intending purchaser.

The Order is good so far as it goes, but it cannot be expected to influence materially the spread of contagious abortion.

It is worthy of note that this very simple Order does not seek to control such a dangerous animal as the cow that is about to abort, and it is notorious that some owners of infected herds in which abortions occur about or after the eighth month of gestation do not hesitate to hasten to the market and sell without remark the animal that exhibits the symptoms of impending abortion, and many such have an appearance of milk equivalent to that of a cow that has gone her full time. The purchaser may be able to prove when the cow is delivered of her calf at his place that abortion has occurred and get the cow returned, but in the meantime his premises may have been fouled and an outbreak of abortion may result.

Any Order which had for its object the effective control of this disease would require to provide for compulsory notification and veterinary inquiry, and if this proved positive a prolonged period of inspection, quarantining and repeated disinfection of infective cows and premises, cessation of movement of animals for a considerable time, and the eradication of the disease would seem to be impossible without the slaughter of every cow that has aborted.

When one is aware of the wide extent of the sources of infection, the effect on the dairying industry of the country of an Order containing provisions of the nature indicated, could only be regarded with the most serious apprehension.

Even if an Order—bereft of its article providing for the slauhter of infective and potentially infective animals, but more comprehensive than the Epizootic Abortion Order of 1920—were enforced, the existence of the disease would still continue. Moreover, its articles on notification, veterinary inquiry, restriction of movement, etc., would provide many problems that at the present time seem insurmountable, since the attempt to solve them would paralyse milk production. For example, consider the effect of a restriction notice served on the owner of a large number of back-calving cows at grass if

abortion began, as it very often does, and the owner had no premises in which to tie up and milk the cows that were slipping their calves day by day.

If it be conceded then that these objections, which are by no means exhaustive, are sufficient to rob us of the desire for such an Order, it may be urged that this new Order might, with good reason, have included at least compulsory notification of disease. That, however, would not help matters much, and, as failure to notify would constitute an offence, it might, as is alleged in Devon, have the effect of keeping stock-owners from applying for vaccine treatment.

It has been suggested that compulsory vaccination should be linked to compulsory notification, and that the list of infected farms, etc., should be published by Local Authorities. Such measures would probably materially reduce the havoc caused by the disease, but power has never yet been granted in this country to inoculate any animal with serum or vaccine or tuberculin or mallein without the full consent of the owner. Further, mere notification of the disease would in itself effect little or no good.

It is becoming more evident that stock-owners, who fear the disease most, understand fairly well how to protect their herds. Every farmer should read the "Leaflet No. 108" on Epizootic Abortion, issued by the Ministry of Agriculture and Fisheries, and act on the advice given therein. Perhaps, however, it may not be out of place here to set down a few precautions that owners of herds, free from abortion disease, would do well to observe :—

1. Contact of the herd with strange animals should not be allowed.
2. Refuse the use of the bull to strange cows, and don't mate cows with a strange bull. If special circumstances create an excepfion, apply measures of disinfection to the bull.
3. Isolate and prove every bought-in dairy cow, and if a newly-born calf is bought it should also be isolated, and its dejecta disinfected for a period of ten days.
4. Be careful of grazing pregnant cows on common pasture where they may be exposed to infection.
5. Avoid soiling of fodder by strange persons or dogs or other animals coming about the premises.
6. If any cow calves prematurely or shows signs of impending abortion, isolate her at once and call in a veterinary surgeon to treat her, adopt measures of disinfection, and take a sample of blood to test the nature of the case.
7. The vaccine, "Anti-Abortion A," should not be used as a preventive in a clean herd.

The Epizootic Abortion Order of 1920 will, if taken advantage of by Local Authorities generally, help a little to limit the spread of the disease, but past experience and the present position of matters suggest that it would be unwise to extend its scope in the near future.

Despite certain accidental drawbacks (only occasionally met with) to the use of vaccine for the prevention and control of contagious abortion, the experience gained in Lanarkshire in upwards of one hundred outbreaks and the statistics of others who have also used it extensively in conjunction with efficient measures of disinfection, serve to show that the vaccine, "Anti-Abortion A," prepared by Sir Stewart Stockman at the laboratory of the Ministry of Agriculture and Fisheries, is a most efficient agent in combating an outbreak of the disease. The vaccine is supplied on demand at a cost that is only sufficient to defray the expense of carriage. Measures should be adopted to extend the use of vaccine in infected cow sheds, and an endeavour should be made to educate stock-owners further regarding the nature of the disease.

HUGH BEGG, F.R.C.V.S.

MILK AND TUBERCULOSIS.

Report on the procedures carried out under the Model Milk Clauses, prepared under the supervision of Dr. W. A. Young, for the Medical Officer of Health. Section of Report on the Health of the City of Manchester, 1918, by James Niven, M.A., M.B., LL.D.

"During the year 1918 we have still been without the services of our regular Veterinary Surgeon, Lieut.-Col. Brittlebank, C.M.G., M.R.C.V.S., D.V.S.M. The work of following up positive station samples of tuberculous milk and the examination of cows within the City has been done partly by Mr. J. F. Dixon, M.R.C.V.S., who was loaned by the Markets Committee to the Hospitals Sub-Committee one day each week for a portion of the year. Pressure of work under the various Meat Rationing Orders prevented the fulfilment of this arrangement. For the latter portion of the year, Mr. J. B. Wolstenholme, F.R.C.V.S., has acted as Veterinary Officer, and much valuable work has been accomplished in the limited time at disposal.

The Manchester Milk Clauses have been operated as in former years, so far as the obtaining of milk samples has been concerned and the following up of positive station samples. The change in dealing with the cows found to have positive tuberculous lesions in the udder reported last year, which was brought about by the operation of the Cattle Sales Order of December 17th, 1917, has been found to work fairly satisfactorily. Advantage has been taken under the Order of the provisions for emergency slaughter in many cases. Where this course has been adopted the affected animal has been slaughtered on the farm, or at some slaughter-house in the neighbourhood of the farm, under the supervision of the local authorities concerned. In several cases the carcases have been so extensively affected as to render the whole unfit for food. These have been destroyed. In other instances the farmers have chosen to send the affected animal to the local auction market to be graded. It has not been possible to trace these animals through the auction to their ultimate destination. Seeing that all cattle are now allotted from the auction to some Butchers' Association, acting under the Local Food Control Committees, it is most probable that the carcases receive due inspection in the towns to which they are consigned, but it is not possible either from Manchester or through the Local Authorities to have the cows inspected by a veterinary surgeon at slaughter.

In a number of cases the farmers have informed the Grading Officer of the condition of the animal beforehand, so that the cow has been graded according to its known condition. Steps have then been taken to have the cow slaughtered locally, under the supervision of the authorities. The farmer, under these circumstances, only receives the maximum value of such portions of the carcase as are passed as fit for human consumption. Our efforts in dealing with tuberculous animals have been steadily maintained throughout the year. The Medical Officer of Health for the County and the Medical Officer of Health for the district concerned have been kept well informed of each succeeding step, so that the affected animal is kept under observation from its discovery until its death.

The percentage of farmers whose milk was examined and who were found to be sending tuberculous milk was 6·25 per cent. It will be seen that this is the lowest point reached, except in the year 1909. This is all the more satisfactory when the difficulties as to food for cattle are taken into consideration. The country farmer, no less than the City farmer, was greatly hampered in 1918 by the great shortage of feeding stuffs for cattle. They had to rely very largely on their own resources for whatever corn was fed to the cattle. Many farmers have again experienced a shortage of hay. Straw had to be fed to cattle in considerable quantities.

Visits were paid to 19 country farms from which tuberculous milk was being sent into the City. The herds on these farms numbered 532. 11 farms were revisited owing to the control samples proving tuberculous, or to supervise the slaughter of tuberculous cows, whilst one farm was visited three times before the animals concerned were discovered. 16 cows were proved to have tuberculous lesions in their udders. All of these were slaughtered.

On three farms there were two tuberculous cows on each, whilst on several farms the offending cow or cows had been disposed of prior to our visit. Station control samples of milk were obtained in every instance following the result of the examination of the individual samples of milk, negative results being obtained in all cases.

The number of farms within the City which are occupied as dairy farms is 92, whilst the number of cows kept is 1,329.

Forty-two City farms and their herds were inspected during the year by Mr. J. F. Dixon, M.R.C.V.S., and Inspector Higginbotham, or by Inspectors Higginbotham and Priestley. The herds on these farms numbered 762. Individual samples were obtained from 18 cows, one of which gave a positive result. This cow was slaughtered at the Manchester abattoirs, certain portions of the carcase being passed as fit for human consumption. 42 mixed samples were obtained all of which gave negative results. It was not found possible to visit the whole of the farms owing to the shortage of staff and the pressure of other urgent work.

The general condition of the cows which were examined was distinctly good, considering the shortage of many feeding stuffs previously thought to be almost indispensable.

Brewers' grains, indian meal, and feeding cakes of all kinds were very scarce indeed; it may almost be said that the first half of the year was the worst experienced during the war period. Hay, home-grown oats damaged by weather, and roots have formed the principal foods. The milk yield is said by some farmers to have been less than usual owing to food difficulties.

The cows do not appear to have suffered as the result of the impoverished ration.

The general cleanliness of cowsheds and cows, except at a few farms where the farmers take a great interest on their stock, leaves much to be desired. Labour shortage was the principal excuse put forward for the unsatisfactory conditions.

Advantage, however, was not generally taken of the services of girls of the Land Army. Tributes to their work were paid in one or two instances.

Dairy Utensils and Sterilisation

Many cases of unsatisfatory dairy utensils have been reported during the year, both as regards cleanliness and unsuitability of the metals in use. A practice of using ordinary galvanised buckets has grown up that cannot be too strongly condemned. The zinc used in the process of galvanising leaves a rough surface to which the milk solids adhere in ever-increasing quantity until a distinct yellow coating covers the interior of the bucket. This coating defies the usual methods adopted by farmers for cleansing their tinned-ware vessels. In two instances prosecutions were undertaken against farmers who had been previously warned. A fine was imposed in one instance. In the other a severe warning was administered by the presiding magistrate.

A sterilising plant designed by Professor Delépine has been installed in the Civic Buildings, where demonstrations can be given A considerable number of farmers have attended, but the response has not been such as might have been expected.

Outbreak of Anthrax.

During the year two individual cases of anthrax have occurred on farms within the City, situate about three miles from each other. In both instances the Board of Agriculture certified the disease.

So far as could be ascertained, there had not been any cases of anthrax within or adjoining the district, though there were other cases of anthrax reported about this time in Cheshire, about 20 miles distant.

Very careful enquiries in each case concerning the possibility of infection having been conveyed by a cattle dealer or person employed at a neighbouring tannery, suspicious illnessess amongst the members of the farmers' families, the introduction of articles containing hair, or brushes, were made without result.

Both farmers purchased feeding stuffs from several corn millers, one as far distant as 8 miles. There was one miller, however, common to both. Enquiries were directed into the kind and character of the feeding stuffs. Samples were obtained in the latter case and tested by Professor Delépine without result. The corn miller common to both was interviewed. The manager of the works raised the question of infection being conveyed by means of infected bags. Speaking generally, millers never expect to receive their own bags back again. Bags are indiscriminately purchased wherever they are on offer. Their previous contents are unknown to the miller on purchasing. The bags are not treated in any way whatever before being filled with cattle feeding stuffs and despatched to the farmers.

An examination of the empty sacks found at Farm B revealed in several cases their primary origin. A list is submitted below, from which it will be seen how it is possible by means of these bags to convey from place to place, or from country to country, any of the diseases common to farm animals. During times of epidemics — swine fever, foot-and-mouth disease, anthrax, etc., the Board of Agriculture and Fisheries restrict the movement of cattle from place to place under severe penalties. The corn miller, however, with his sacks purchased indiscriminately, and soiled with filth from the floors of cowsheds or piggeries, passes from farm to farm unhindered and unchecked. It was also stated that the sacks were thrown over cows for protection. The time has arrived, having regard to the high cost of animals and the necessity of saving food, when millers should be compelled to provide clean sterilised wholesome sacks in which to deliver their feeding stuffs. The markings on the miller's corn bags on Farm B were :—

One, Tuzelli Graanfluer O.O.O. 12245 Cyantieur Port St. Louis du Rhone.
One, Quaker Golden Maise Quaker Oat Coy. Chicago, U.S.A.
Three from three English Counties.
Three marked with lines only.
Six without any marking.

The miller states this is the general run of bags they fill with feeding stuffs. They obtain them anywhere, fill them with feeding stuffs, and send them anywhere. This is said to be the general practice of millers throughout the country.

PARLIAMENTARY.

In the House of Commons.

Motor-car Rebates.

Sir William Joynson-Hicks asked the Minister of Transport whether it was intended, under the new scheme for the taxation of mechanically propelled motor vehicles, to grant any special privileges, exemptions, or rebates in respect of motor-cars used by doctors and veterinary surgeons similar to the privileges enjoyed by

them under the present system of taxation ; and, if not, upon what grounds it was proposed to withdraw the existing privileges.

Mr. NEAL (Parliamentary Secretary to the Ministry of Transport) replied : There is no intention to give special privileges to these classes of motor-car users. This question was carefully considered by the Departmental Committee on Taxation and Regulation of Road Vehicles, and the reasons for the withdrawal of existing privileges are set out in par. 23 of their report. The rebates which these users now enjoy were conceded partly in order to bring them into line with commercial motor vehicles, which pay no Inland Revenue duty and are entitled to a rebate of half the duty on motor spirit. With the abolition of preferential treatment to commercial users the case for medical practitioners and veterinary surgeons necessarily fails. There could be no justification for exempting members of two professions only. Every person using a motor-car in connexion with his profession or business would be equally entitled to preferential treatment. The concession to medical practitioners and veterinary surgeons was made when motor cars were taxed as luxuries. This is now no longer the case. The proposed tax is a tax upon road users for road purposes.

R.C.V.S. WAR MEMORIAL.

The Secretary begs to acknowledge the receipt of the following donations, or promises of donations :—

J. Aitken	1	1	0
E. C. Bowes	1	1	0
H. S. Cockburn	1	1	0

R.C.V.S. War Memorial continued.

R. Cockburn	5	5	0
B. S. Cockerton	1	1	0
F. T. G. Hobday	2	2	0
J. S. Keane	2	2	0
H. C. Wilkie	2	2	0
H. H. Worrow	1	1	0
S. E. Sampson	1	1	0
Previously reported	561	5	0
	£579	2	0

SUBSCRIPTIONS TO R.C.V.S.

The Secretary of the Royal College of Veterinary Surgeons begs to acknowledge the receipt of the following subscriptions for 1920.

Brain, T. J., Cheltenham	£1	1	0
Cane, J., Wrexham	1	1	0
Cockburn, H. S., Eastwood	* 1	11	6
Cockburn, R., Eastwood (additional)		10	6
Cockerton, B. S., London. E. 2.	1	1	0
Gillmor, D. A., Capt. R.A.V.C.	1	1	0
Keir, D., Ministry of Agriculture	1	1	0
Lindsay, P. T., Tamworth	1	1	0
McIntyre, G. E., Leek	1	1	0
Oxspring, G. E., Capt. R.A.V.C.	1	1	0
Petrie, W. S., Ministry of Agriculture	1	1	0
Sampson, S. E., Sheffield, 1919, 1920	2	2	0
Young, T. P. Leith	1	1	0
Previously acknowledged	776	1	1
May 19.	£790	15	1

* Including 10/6 additional subscription

DISEASES OF ANIMALS ACTS 1894 TO 1914, SUMMARY OF RETURNS.

Period.		Rabies. Cases Confrmd: Dogs	Rabies. Cases Confrmd: Other Anmls	Anthrax: Out-breaks (a)	Anthrax: Animals.	Foot-and-Mouth Disease.: Out-breaks (a)	Foot-and-Mouth Disease.: Animals.	Glanders.†: Out-breaks (b)	Glanders.†: Animals.	Parasitic Mange.: Out-breaks (b)	Parasitic Mange.: Animals.	Sheep Scab. (b)	Swine Fever.: Out-breaks (a)	Swine Fever.: Slaughtered. *
GT. BRITAIN. Week ended May 15				14	17					58	90	3	60	29
Corresponding week in	1919	6		6	9					99	164		60	32
	1918			4	4					88	163	2	40	14
	1917			7	7					51	83	6	66	24
Total for 20 weeks, 1920		4		200	236	42	2432	10	17	2313	3999	279	904	313
Corresponding period in	1919	85	3	77	105	19	1033	6	30	2986	5661	211	598	224
	1918			124	139			14	38	2485	4771	229	459	154
	1917			259	284			11	20	1348	2771	364	1053	444

(a Confirmed. (b) Reported by Local Authorities.
Board of Agriculture and Fisheries, May 18, 1920

† Counties affected, animals attacked :—
Excluding outbreaks in army horses.

Period.		Rabies. Cases Confrmd: Dogs	Rabies. Cases Confrmd: Other Anmls	Anthrax: Out-breaks (a)	Anthrax: Animals.	Foot-and-Mouth Disease.: Out-breaks (a)	Foot-and-Mouth Disease.: Animals.	Glanders.†: Out-breaks (b)	Glanders.†: Animals.	Parasitic Mange.: Out-breaks (b)	Parasitic Mange.: Animals.	Sheep Scab. (b)	Swine Fever.: Out-breaks (a)	Swine Fever.: Slaughtered. *
IRELAND. Week ended May 15.				...	...	...	...			Outbreaks 4		1		
Corresponding Week in	1919 ...			...	...	...	...	...	...	1		1		
	1918 ...			...	...	...	...	...	...	4		5		
	1917 ...			...	...	...	...	...	...	4		2	4	24
Total for 20 weeks, 1920				1	1	...	...	1	3	64		144	4	16
Corresponding period in	1919 ...			...	...	...	...	1	1	59		145	16	57
	1918 ...			1	1	...	...	...	...	65		163	7	27
	1917 ...			2	2	...	...	1	1	22		208	121	841

Department of Agriculture and Technical Instruction for Ireland, (Veterinary Branch), Dublin, May. 17, 1920

NOTE.—The figures for the Current Year are approximate only.

* As Diseased or Exposed to Infection.